



Joint Science Meeting for TEMPO, GeoXO ACX, & TOLNet

May 1-5, 2023

Location: Shelby Center, University of Alabama in Huntsville

301 Sparkman Drive, Huntsville, AL 35899

Virtual Platform Option: Zoom

**Participants will receive login details & instructions closer to the event date*

Description:

A joint science meeting for the [TEMPO](#), [GeoXO ACX](#) (Atmospheric Composition Instrument), and [TOLNet](#) programs will be held at the University of Alabama in Huntsville (UAH) from May 1-5, 2023, themed “Building the Pathway from TEMPO to GeoXO.” The joint meeting will bring together the TEMPO Science Team and Early Adopters Program along with the GeoXO and TOLNet Science Teams to facilitate the coordination and long-term planning of air quality observations over North America from Geostationary Earth Orbit, with TEMPO scheduled for launch in April 2023 and GeoXO ACX expected to launch in the early 2030s. Hourly temporal resolution of both trace gases and aerosols from the TEMPO and GeoXO ACX missions are set to significantly advance our capabilities to understand, monitor, and predict air quality, weather, and climate over the next few decades.

The meeting format will be organized into discussion sessions involving designated moderators and panelists, with topics (non-exhaustive) on [TEMPO Green Paper](#) “special” experiments, the GeoXO mission, TEMPO validation, correlative campaigns, science studies, and applications, in addition to a week-long poster session with two designated viewing times during the week. Hands-on training sessions focused on TEMPO proxy data will also be offered at the meeting. A detailed meeting agenda is shown below.

Everyone, including virtual participants, is encouraged to bring a poster. UAH is providing the ability to print in house (at UAH) these posters for you, free of charge. UAH printing will include putting it on display as well.

We will accommodate everyone in both physical meeting rooms on the UAH campus and with Zoom access. There will be planned outings on Tuesday evening at Burritt Museum (with buffet dinner), on Wednesday at the Space and Rocket Center (sit-down dinner under the Saturn V rocket in the Davison Center), and a buffet lunch at the Huntsville Botanical Gardens on Thursday

This meeting is open to individuals who are interested in the TEMPO, GeoXO ACX, and TOLNet Programs. We especially welcome students and early-career professionals to attend the meeting.

Virtual and in-person participants will have live access to all discussions including verbal and Zoom chat. Moderators will solicit and compile all slides / visualizations for the discussion sessions.

Objectives:

1. Develop a robust strategy for implementing the TEMPO “Green Paper” science experiments and coordinating and enhancing the special operation data from the TEMPO mission.
2. Scope out a long-term plan between the TEMPO and GeoXO missions for maximizing science and applications from geostationary air quality observations into the future.
3. Advance the science and validation facets of the TEMPO mission through organized discussions involving multiple programs, paving the way for GeoXO.
4. Better understand the end-user and stakeholder needs of geostationary air quality data, with a special focus on the TEMPO special operations, near real-time data, and value-added products.
5. Provide hands-on training using TEMPO proxy data to facilitate the use of operational TEMPO data and prepare the community for the future of geostationary air quality data.



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Schedule At A Glance

All Times in Central Daylight Time (CDT)

All sessions are open to all meeting participants

Session Types	Color Code
TEMPO Science Team	
TEMPO Early Adopter	
TEMPO Green Paper	
GeoXO ACX Science Team	
TOLNet Science Team	

	Monday	Tuesday	Wednesday	Thursday	Friday
	Date: 5/1/2023	Date: 5/2/2023	Date: 5/3/2023	Date: 5/4/2023	Date: 5/5/2023
7:30 AM		Breakfast	Breakfast	Breakfast	Breakfast
8:00 AM	Breakfast				
8:30 AM		Session I: TEMPO & GEMS Mission Updates	Session I: Air Quality Modeling	Session I: TEMPO / TOLNet Joint Panel	Session I: Air Quality & Health
9:00 AM					Break (15 min)
9:30 AM					
10:00 AM	Session I: TEMPO Green Paper Experiments	Break	Break	Session II: Poster Viewing	Session II: TEMPO Data
10:30 AM		Session II: TEMPO Green Paper Experiments	Session II: TEMPO Validation		
11:00 AM					Lunch
11:30 AM				Lunch Botanical Gardens	
12:00 PM	Lunch	Lunch	Lunch		Lunch
12:30 PM					
1:00 PM		Session III: TEMPO / GeoXO Joint Panel	Session III: Steep Gradients	Session III: TEMPO Early Adopters / Science Team Joint Panel	Session III: TEMPO Training
1:30 PM	Session II: GeoXO ACX Introduction & Status				
2:00 PM					
2:30 PM			Break (15 min)	Session IV: TEMPO Early Adopters / Science Team Joint Panel (End @ 3:50 PM)	
3:00 PM	Break	Session IV: Posters	Session IV: Emissions		
3:30 PM				Break (End @ 4:10 PM)	
4:00 PM	Session III: GeoXO Value Studies		Session V(a): Aerosols	Session V: TEMPO Early Adopters / Science Team Joint Panel	
4:30 PM			Session V(b): Land & Ocean Monitoring		
5:00 PM					
5:30 PM		Dinner Burritt Museum	Museum Viewing & Dinner Space and Rocket Center		
6:00 PM					
6:30 PM					

Agenda

All Times in Central Daylight Time (CDT)

All sessions are open to all meeting participants

Monday, May 1: TEMPO Green Paper & GeoXO ACX Science Team

Start	ΔTime	Description	Speaker / Moderator / Panelists
Session I: TEMPO Green Paper Experiments - Moderator: Aaron Naeger (UAH / NASA)			
8:00 AM	:50	Breakfast served @ Shelby Center	
8:50 AM	:10	Check-In & Audio Check	
9:00 AM	:20	Welcome & Overview of Special Operations	Aaron Naeger (UAH / NASA)
9:20 AM	1:00	Green Paper Experiments: Lightning Talks	Talks: To be announced
10:20 AM	:50	<div>Panel Discussion<ul style="list-style-type: none">Needs for special operationsCoordination and synergy between experimentsNotice of event to special operations modeData latency requirements</div>	Panelists: To be announced
11:10 AM	:50	Questions & Discussion	All
12:00 PM	1:00	Lunch	

GeoXO ACX Science Team Meeting			
Session II: GeoXO ACX Introduction & Status			
1:00 PM	:30	Welcome and GeoXO Program	Andrew Heidinger (NOAA)
1:30 PM	:15	GeoXO ACX Instrument Studies	Joanna Joiner (NASA)
1:45 PM	:15	GeoXO Algorithm and Product Development Plans	Shobha Kondragunta (NOAA)
2:00 PM	:15	Atmospheric Composition Applications of ACX using TEMPO as a proxy	Greg Frost (NOAA)
2:15 PM	:15	Introduction to GeoXO ACX Science Team	Greg Frost (NOAA)
2:30 PM	:30	Questions & Discussion	All
3:00 PM	:15	Break	
Session III: GeoXO Value Studies			
3:15 PM	:15	NOAA Value Assessment Studies Background	Monika Kopacz (NOAA)
3:30 PM	:15	Aerosol Product Study	Shobha Kondragunta (NOAA)
3:45 PM	:15	Trace Gas Emission Updates Study	Brian McDonald (NOAA)
4:00 PM	:15	Health Impact Study	Susan Anenberg (GWU)
4:15 PM	:45	Round Table with GeoXO ACX Science Team	All
Adjourn @ 5:00 PM			

Dinner: Self-organized

Tuesday, May 2: Joint TEMPO Science Team, TEMPO Green Paper, & GeoXO ACX

Start	ΔTime	Description	Speaker / Moderator / Panelists
TEMPO Science Team Meeting Day 1			
Session I: GEO Air Quality Constellation Updates - Moderator: Michael Newchurch (UAH)			
7:30 AM	:50	Breakfast served @ Shelby Center	
8:20 AM	:10	Check-In & Audio Check	
8:30 AM	:10	Greeting	Barry Lefer (NASA)
8:40 AM	:10	Introduction & TEMPO Program Status	Kelly Chance (SAO)
8:50 AM	:10	TEMPO Commissioning Update	Kevin Daugherty (NASA)
9:00 AM	:10	TEMPO Inflight Operations	Raid Suleiman (SAO)
9:10 AM	:10	TEMPO Product Updates	Xiong Liu (SAO)
9:20 AM	:10	TEMPO Data Distribution	Hazem Mahmoud (NASA)
9:30 AM	:15	GEMS Mission & Product Updates	Jhoon Kim (Yonsei Univ.)
9:45 AM	:15	Sentinel-4 operational products	Diego Loyola (DLR)
10:00 AM	:10	Satellite Needs Working Group	Pontus Olofsson (NASA)
10:10 AM	:10	Questions & Discussion	All
10:20 AM	:20	Break	
Session II: TEMPO Green Paper Experiments - Moderator: Aaron Naeger (UAH / NASA)			
10:40 AM	1:00	<div>Enhancing TEMPO Science & Applications Using Special Operations Data</div> <ul style="list-style-type: none">• Coordination plans with users• Observations outside nominal Field of Regard• Special operations during commissioning phase• Data dissemination	Panelists: To be announced

		<ul style="list-style-type: none">Other science applications not yet in Green Paper	
11:40 AM	:20	Questions & Discussion	All
12:00 PM	1:00	Lunch served @ Shelby Center	
Session III: TEMPO / GeoXO Joint Panel - Moderator: Michael Newchurch (UAH)			
1:00 PM	1:30	<i>Paving the Future of Geostationary Air Quality Observations</i> <ul style="list-style-type: none">Research-to-OperationsNew science to be addressedEarly adopters to PathfindersFuture partnershipsTEMPO Continuity Instrument (TEMPO-CI)	Panelists: To be announced
2:30 PM	:30	Questions & Discussion	All
Session IV: Posters - Host: Michael Newchurch (UAH)			
3:00 PM	1:00	Lightning Poster Talks 1-2 minute each	Talks: To be announced
4:00 PM	1:00	General Poster Viewing Session	Posters: To be announced
Adjourn @ 5:00 PM			

Dinner: @ Burritt Museum immediately following the meeting. Transportation from meeting venue to dinner to hotel.

Wednesday, May 3: TEMPO Science Team

Start	ΔTime	Description	Speaker / Moderator / Panelists
TEMPO Science Team Meeting Day 2			
Session I: Air Quality Modeling - Moderator: Matthew Johnson (NASA)			
7:30 AM	:50	Breakfast served @ Shelby Center	
8:20 AM	:10	Check-In & Audio Check	
8:30 AM	1:10	<i>Preparing Air Quality Modeling Systems for TEMPO Data</i> <ul style="list-style-type: none">• Consistent validation coordinate system<ul style="list-style-type: none">○ GEOS-CF○ NOAA’s National AQ Forecast Capabilities○ RAQMS○ GEOS-Chem• Assimilation methods for forecasting	Panelists: To be announced
9:40 AM	:20	Questions & Discussion	All
10:00 AM	:30	Break & Helicopter Landing	
Session II: TEMPO Validation - Moderator: John Sullivan (NASA)			
10:30 AM	:45	<i>TEMPO Validation Components and Plans</i> <ul style="list-style-type: none">• Pandora• TOLNet• EPA• AERONET• GCAS/HSRL2/SeaRey/DC8• Funded Campaigns (Summer 2023)<ul style="list-style-type: none">○ STAQS○ AEROMMA○ GOTHAM○ CUPiDS• Future campaign ideas (Summer 2024 and beyond)	Panelists: To be announced

		<ul style="list-style-type: none">International partners (Mexico, Canada, Puerto Rico, EU, Korea)	
11:15 AM	:30	Questions & Discussion	All
11:45 AM	1:15	Group photo, then Lunch served @ Shelby Center	
Session III: Steep Gradients - Moderator: Ron Cohen (UC Berkeley)			
1:00 PM	1:10	<i>Resolving Steep Gradients with TEMPO</i> <ul style="list-style-type: none">Diurnal / SZA limitsUrban / RuralCoastlinesLakeshoresPBL free troposphereUrban gradients	Panelists: To be announced
2:10 PM	:20	Questions & Discussion	All
2:30 PM	:15	Break	
Session IV: Emissions - Moderator: Randall Martin (WashU)			
2:45 PM	:50	<i>Assessing Diurnal Emissions with TEMPO</i> <ul style="list-style-type: none">LightningAgricultureTransportationIndustryVolcanoesWildland firesDust	Panelists: To be announced
3:35 PM	:25	Questions & Discussion	All
Parallel Sessions V			
Session V(a): Aerosols - Moderators: Shobha Kondragunta (NOAA)			
4:00 PM	:40	<i>Developments and Expectations of Aerosols from TEMPO</i> <ul style="list-style-type: none">Aerosol product suite and resolutionTEMPO/GOES enhanced products	Panelists: To be announced

		<ul style="list-style-type: none"> NASA and NOAA coordination and product developments Future value-added products 	
4:40 PM	:20	Questions & Discussion	All
Session V(b): Land & Ocean Monitoring - Moderator: Joanna Joiner (NASA)			
4:00 PM	:40	<i>Spatiotemporal Land and Ocean Monitoring with TEMPO</i> <ul style="list-style-type: none"> TEMPO products for land and ocean monitoring SIF and vegetation stress early detection Drought responses Red tide detection TEMPO-GLIMR synergy 	Panelists: To be announced
4:40 PM	:20	Questions & Discussion	All
Adjourn @ 5:00 PM			

Museum viewing & then Dinner: @ Space and Rocket Center immediately following the meeting. Transportation from meeting venue to dinner to hotel.

Thursday, May 4: Joint Sessions w/ TEMPO Science Team, Early Adopters, TOLNet

Start	ΔTime	Description	Speaker / Moderator / Panelists
10 th Annual NASA TOLNet Science Team Workshop Day 1			
Session I: TEMPO / TOLNet Joint Panel - Moderator: John Sullivan (NASA)			
7:30 AM	:50	Breakfast served @ Shelby Center	
8:20 AM	:10	Check-In & Audio Check	
8:30 AM	1:10	<i>TOLNet for Improved TEMPO Validation and Science Results</i> <ul style="list-style-type: none">• Vertical and temporal gradients• Air-quality processes• Times and places for TEMPO / TOLNet synergy• Horizontal scans across gradients• Nocturnal boundary layer and jets	Panelists: To be announced
9:40 AM	:20	Questions & Discussion	All
Session II: Poster Viewing - Host: Michael Newchurch (UAH)			
10:00 AM	1:00	Shelby Building Grand Lobby	Posters: To be announced
11:00 AM	2:00	Lunch @ Huntsville Botanical Gardens (Transportation provided)	
TEMPO Early Adopters Workshop Day 1			
1:00 PM	:10	Greeting from Applied Sciences Program	John Haynes (NASA)
Session III: TEMPO Early Adopters / Science Team Joint Panel - Moderator: Aaron Naeger (UAH / NASA)			
1:10 PM	1:00	<i>TEMPO Data for Extreme Events and Disasters</i> <ul style="list-style-type: none">• Wildland fires	Panelists: To be announced

		<ul style="list-style-type: none">• Volcanoes• Dust storms• Industrial accidents• Extreme weather events• Operational models• Product and latency needs	
2:10 PM	:20	Questions & Discussion	All
Session IV: TEMPO Early Adopters / Science Team Joint Panel - Moderator: Allan Just (Mount Sinai)			
2:30 PM	1:00	<i>Advancements in Environmental Health Applications with TEMPO</i> <ul style="list-style-type: none">• Public health• Environmental justice• Vegetation health• Harmful algal blooms• Product and latency needs	Panelists: To be announced
3:30 PM	:20	Questions & Discussion	All
3:50 PM	:20	Break	
Session V: TEMPO Early Adopters / Science Team Joint Panel - Moderator: Aaron Naeger (UAH / NASA)			
4:10 PM	1:00	<i>Cross-Mission & Program Synergy for Enhanced Applications</i> <ul style="list-style-type: none">• GLIMR• MAIA• GOES• PACE• TROPICS• NACHOS• NASA SERVIR• NASA Disasters	Panelists: To be announced
5:10 PM	:20	Questions & Discussion	All
Adjourn @ 5:30 PM			

Dinner: Self-organized

Friday, May 5: Parallel TOLNet and TEMPO Early Adopters Workshops

Start	ΔTime	Description	Speaker / Moderator / Panelists
10th Annual NASA TOLNet Science Team Workshop Day 2			
7:30 AM	:50	Breakfast served @ Shelby Center	
8:20 AM	:10	Check-In & Audio Check	
8:30 AM	:10	TOLNet Introduction	Michael Newchurch (UAH)
8:40 AM	1:00	TOLNet Station Updates (LaRC, GSFC, CCNY, ECCC, Hampton) 10 minute / 2 slides	Tim Berkoff (NASA), John Sullivan (NASA), Fred Moshary (CCNY), Kevin Strawbridge (ECCC), Ruben Delgado (Hampton U.)
9:40 AM	:20	Break	
10:00 AM	:45	TOLNet Station Updates (UAH, NOAA, JPL/TMF, Ames) 10 minute / 2 slides	Thierry Leblanc (NASA), Andy Langford (NOAA), Chris Senff (NOAA), Shi Kuang (UAH), Matthew Johnson (NASA)
10:45 AM	:15	Data LaRC Update on Archive/Merge to Earthdata	Michael Shook (NASA), Crystal Gummo (NASA), Gao Chen (NASA)
11:00 AM	1:00	TOLNet Data Discussion for the Future <ul style="list-style-type: none"> Update: Centralized Processing for TEMPO Update: SMOL Website 2.0 Launch (API, graphical capabilities) 	All
TOLNET Science Team Workshop - Adjourn @ 12:00 PM			

TEMPO Early Adopters Workshop Day 2			
7:30 AM	:50	Breakfast served @ Shelby Center	
8:20 AM	:10	Check-In & Audio Check	
Session I: Air Quality & Health Applications - Moderator: Barron Henderson (EPA)			
8:30 AM	1:00	<i>Accelerating Use of TEMPO Data at Air Quality & Health Agencies</i> <ul style="list-style-type: none">• Exceptional event demonstrations• Air quality emissions & monitoring• Air quality forecasting• Long-term pollutant trends• Health assessments	Panelists: To be announced
9:30 AM	:15	Questions & Discussion	All
9:45 AM	:15	Break	
Session II: TEMPO Data Distribution & Proxy Data - Moderator: Ryan Wade (UAH / NASA)			
10:00 AM	:50	<i>Distribution of TEMPO Data and Proxy Data Developments</i> <ul style="list-style-type: none">• Operational data updates• NASA ASDC updates• EPA RSIG gateway• TEMPO proxy data• NASA SPoRT initiatives	Panelists: To be announced
10:50 AM	:10	Questions & Discussion	All
11:00 AM	1:00	Lunch served @ Shelby Center	
Session III: TEMPO Training - Moderator: Kevin Fuell (UAH / NASA)			
12:00 PM	2:30	<i>TEMPO Proxy Data Access, Tools, and Demonstrations</i> <ul style="list-style-type: none">• TEMPO proxy data briefing• Earthdata walkthrough• ArcGIS Dashboard• Tools for processing and analyzing TEMPO data• Hands-on training examples	To be announced